

At latitude 50° , one degree of the small circle of latitude is 44.552 statute miles. Therefore, 90° , or one-quarter of the circle, is 4009.7 miles. At the rate of 30 miles per hour, this would be described in 133.7 hours, or five days and fourteen hours, and the whole circle would be described in twenty-two days and eight hours. On the other hand, if the storm centers are supposed to follow the wind and the isobars at about 3 miles above the earth's surface, as shown in the MONTHLY WEATHER REVIEW for November, 1896, Chart VII, or in Professor Bigelow's

Report on International Cloud Observations, charts 40 and 43, then, owing to the oval form of these isobars, the track may be somewhat shorter than the small circle, and the time of describing the oval may be seventeen days. In general the daily weather predictions depend upon evidence as to what the storm center's path will be. Sometimes we can look ahead several days and see that storms will pass far to north or south, but the rules governing their average paths are not yet worked out satisfactorily.

THE WEATHER OF THE MONTH.

By Mr. W. B. STOCKMAN, District Forecaster, in charge of Division of Meteorological Records.

PRESSURE.

The distribution of mean atmospheric pressure is graphically shown on Chart VIII and the average values and departures from normal are shown in Tables I and VI.

The mean monthly barometric pressure was high over the Rocky Mountain and Pacific districts, northern Missouri Valley and North Dakota, with the crest over portions of the middle and northern Plateau regions, the maximum mean pressure for the month being 30.30 inches at Boise, Idaho. The mean pressure was low over southern Florida, northern New England, and the northeastern portion of the upper Lake region. The minimum mean pressure was 30.02 inches at Eastport, Me.

The mean pressure was above the normal from Mexico and the western portion of the coast of Texas northward and northwestward to the Canadian boundary of Idaho and Washington, and westward to the Pacific Ocean; also in North Dakota, the upper Lake region, New England, Middle Atlantic States, and northern portion of the South Atlantic States; in all other districts it was below normal. The greatest excess of pressure ranged from $+0.15$ inch to $+0.19$ inch, and occurred in the north and middle Pacific districts. The greatest deficiency in pressure ranged from -0.06 inch to -0.08 inch, and occurred in Montana.

The mean pressure increased over that for December, 1903, in the Pacific districts south of Washington, in southwestern Arizona, northern part of the South Atlantic States, Middle Atlantic States, New England, Lake region, northern portions of the upper Mississippi and Missouri valleys, and North Dakota; elsewhere the mean pressure showed a decrease.

The greatest increase in pressure occurred over New England, northern portion of the Middle Atlantic States, eastern lower Lake region, and northern upper Lake region. The greatest decrease was reported from the northern and middle slope and Plateau regions.

TEMPERATURE OF THE AIR.

The distribution of maximum, minimum, and average surface temperatures is graphically shown by the lines on Chart V.

By geographic districts the temperature was above normal in the west Gulf States, Missouri Valley, and the northern and middle slope, northern Plateau and Pacific regions, and below normal in the remaining districts. The plus departures were very marked in the northern slope and northern Plateau regions, as were the minus departures in the Atlantic States and Lake region.

East of the Mississippi River the departures generally averaged from -4.0° to -8.7° per day, the greatest daily deficiency occurring over the mountain districts of New York and Pennsylvania. Over the northern Plateau, northern slope, and northern portions of the middle slope and middle Plateau regions the mean daily departures ranged from $+4.0^{\circ}$ to $+12.3^{\circ}$, the departure increasing from the southern portion of the area northwestward, the maximum departures occurring over north-central Montana.

The isotherms of 60° and 50° of mean temperature did not

differ much from their location in January, 1903; 40° and 30° lay somewhat to the southward; east of the Mississippi 20° and 10° lay considerably to the southward; and an isotherm of zero mean temperature, of which there was none in January, 1903, included northern Minnesota, and northeastern North Dakota.

The isotherms of maximum and minimum temperature over the eastern half of the country, as a rule, lay well to the southward of their location in January, 1903.

The average temperatures for the several geographic districts and the departures from the normal values are shown in the following table:

Average temperatures and departures from normal.

Districts.	Number of stations.	Average temperatures for the current month.	Departures for the current month.	Accumulated departures since January 1.	Average departures since January 1.
		°	°	°	°
New England	8	19.0	- 6.0	.....	.....
Middle Atlantic	12	26.1	- 6.1	.....	.....
South Atlantic	10	41.4	- 4.7	.....	.....
Florida Peninsula *	8	57.7	- 2.0	.....	.....
East Gulf	9	45.4	- 3.0	.....	.....
West Gulf	7	47.1	+ 0.5	.....	.....
Ohio Valley and Tennessee	11	30.4	- 3.9	.....	.....
Lower Lake	8	18.6	- 6.7	.....	.....
Upper Lake	10	12.2	- 5.3	.....	.....
North Dakota *	8	4.3	- 1.0	.....	.....
Upper Mississippi Valley	11	17.5	- 3.6	.....	.....
Missouri Valley	11	20.9	+ 1.0	.....	.....
Northern Slope	7	24.0	+ 6.5	.....	.....
Middle Slope	6	30.9	+ 1.9	.....	.....
Southern Slope *	6	38.2	- 0.7	.....	.....
Southern Plateau *	13	26.8	- 0.1	.....	.....
Middle Plateau *	8	24.6	- 1.4	.....	.....
Northern Plateau *	12	31.0	+ 5.6	.....	.....
North Pacific	7	41.6	+ 2.4	.....	.....
Middle Pacific	5	48.0	+ 1.0	.....	.....
South Pacific	4	52.2	+ 1.6	.....	.....

* Regular Weather Bureau and selected voluntary stations.

In Canada.—Prof. R. F. Stupart says:

The temperature was below the average from the western portion of Lake Superior to the Maritime Provinces and very much below in many localities, especially in the Georgian Bay district, the lower Lake region and the Ottawa and upper St. Lawrence valleys, where the negative departures ranged from 5° to 12° . In the Maritime Provinces the departure was from 3° to 5° , and in Quebec from 1° to 5° . British Columbia was generally just the average, while from the Rocky Mountains east to Lake Superior the temperature was everywhere above the average, Manitoba giving a positive departure of 3° to 4° , and the Territories from 3° to 9° , the maxima positive departures occurring in Alberta and southwestern Assiniboia.

PRECIPITATION.

The distribution of total monthly precipitation is shown on Chart III.

The precipitation was normal in the upper Mississippi Valley, and southern slope region; above normal in the Florida Peninsula, and lower Lake region; and below normal in the remaining geographic districts. The most marked departures occurred in the Florida Peninsula, west Gulf States, and the middle and south Pacific districts.

Over central and northern Florida the excess ranged from 2.0 to 4.0 inches, the greatest occurring on the west-central

coast. Deficiencies of 2.0 to 3.8 inches occurred over the Appalachian regions of the Virginias and the Carolinas, the west Gulf States, northern Arizona, and the middle and south Pacific districts. The heaviest precipitation occurred in the north Pacific region, while the precipitation, as a rule, was light from the Pacific district eastward to the Mississippi.

Snow occurred except in the southern portions of the South Atlantic and Gulf States, western Arizona, and southern and western California. At the end of the month snow lay on the ground as far south as the center of the South Atlantic States, northern portion of the east Gulf States, southern portion of the Missouri Valley, and the northern part of the southern slope and central portion of the middle Plateau regions, and as far west as north-central and eastern Oregon, and eastern Washington. Snow on ground was also observed in portions of New Mexico, Arizona, and northeastern California.

Snow occurred far to the southward, and the limit of snow on ground lay much to the southward of January, 1903.

Average precipitation and departure from the normal.

Districts.	Number of stations.	Average.		Departure.	
		Current month.	Percentage of normal.	Current month.	Accumulated since Jan. 1.
		<i>Inches.</i>		<i>Inches.</i>	<i>Inches.</i>
New England.....	8	3.64	92	-0.3	.....
Middle Atlantic.....	12	2.60	79	-0.7	.....
South Atlantic.....	10	3.32	83	-0.7	.....
Florida Peninsula*.....	8	5.41	193	+2.6	.....
East Gulf.....	9	3.71	51	-1.6	.....
West Gulf.....	7	1.40	40	-2.1	.....
Ohio Valley and Tennessee.....	11	2.65	62	-1.6	.....
Lower Lake.....	8	4.12	157	+1.5	.....
Upper Lake.....	10	1.19	60	-0.8	.....
North Dakota*.....	8	0.45	69	-0.1	.....
Upper Mississippi Valley.....	11	1.80	100	0.0	.....
Missouri Valley.....	11	0.90	90	-0.1	.....
Northern Slope.....	7	0.38	66	-0.2	.....
Middle Slope.....	6	0.50	71	-0.2	.....
Southern Slope*.....	6	0.89	100	0.0	.....
Southern Plateau*.....	13	0.21	19	-0.9	.....
Middle Plateau*.....	8	1.01	77	-0.3	.....
Northern Plateau*.....	12	1.06	54	-0.9	.....
North Pacific.....	7	6.17	83	-1.3	.....
Middle Pacific.....	5	1.78	53	-3.6	.....
South Pacific.....	4	0.46	17	-2.3	.....

*Regular Weather Bureau and selected voluntary stations.

In Canada.—Professor Stupart says:

The precipitation was above the average over British Columbia, except in parts of Vancouver Island, the positive departures being pronounced at the interior stations. In the Territories, Manitoba, and Nova Scotia the average was also locally exceeded. The southwestern counties of Ontario likewise recorded a positive departure, but elsewhere in Canada the precipitation was not equal to the average amount, the negative departures ranging from a few tenths of an inch to an inch and a half. The snowfall in many portions of Ontario exceeded the usual quantity, also in some sections of the Maritime Provinces, but the rainfall, especially in the former province, was much below the average amount.

HAIL.

The following are the dates on which hail fell in the respective States:

Alabama, 4, 11, 13, 16. Arizona, 7. Arkansas, 22. California, 17, 18, 19. Connecticut, 13, 22. Idaho, 14. Illinois, 10. Indiana, 22. Iowa, 8. Kentucky, 11. Louisiana, 22. Mississippi, 16, 19, 21, 22. Missouri, 9. Montana, 11. New Jersey, 12. New York, 2, 13, 22, 24, 26. Oregon, 4, 5, 8, 10, 16, 17, 18, 19, 25. Pennsylvania, 2, 20, 21. South Carolina, 11, 26, 28. Tennessee, 2, 11, 22. Texas, 21, 22, 26, 28, 30. Utah, 10, 11, 18. Vermont, 22. Washington, 2, 4, 8, 9, 10, 23, 24. West Virginia, 2.

SLEET.

The following are the dates on which sleet fell in the respective States:

Alabama, 13, 27, 28, 29, 31. Arizona, 19, 20. Arkansas, 21, 22, 25, 26, 31. California, 17, 18, 19. Colorado, 9, 30. Con-

necticut, 13, 20, 21, 22, 23, 26. Delaware, 3, 11, 12, 13. District of Columbia, 2, 26. Florida, 28. Georgia, 4, 6, 7, 13, 26, 28, 31. Idaho, 4, 9, 22, 24. Illinois, 1, 2, 9, 10, 11, 19, 22, 25. Indiana, 1, 2, 10, 11, 21, 22, 25. Indian Territory, 21, 22, 25. Iowa, 3, 8, 9, 10, 18, 19, 20, 21, 22. Kansas, 1, 9, 12, 20, 21, 25, 26, 29, 30, 31. Kentucky, 2, 6, 7, 10, 11, 13, 22, 25, 26, 31. Louisiana, 27, 28. Maine, 22, 23, 24, 31. Maryland, 2, 3, 4, 10, 11, 12, 13, 16, 20, 26. Massachusetts, 12, 13, 16, 22, 23, 26, 27. Michigan, 20, 21, 22. Minnesota, 7. Mississippi, 13, 21, 26, 27, 28, 30, 31. Missouri, 1, 2, 9, 10, 12, 20, 21, 22, 25, 26, 30, 31. Montana, 28, 30. Nebraska, 4, 9, 10, 15, 16, 19, 20, 23, 29, 30. Nevada, 4, 5, 17, 18. New Hampshire, 13, 22, 23. New Jersey, 2, 3, 11, 12, 13, 16, 20, 21, 22, 26. New Mexico, 7. New York, 8, 9, 13, 19, 20, 21, 22, 23, 24, 26. North Carolina, 4, 7, 11, 13, 26, 28, 29, 30, 31. North Dakota, 29. Ohio, 1, 2, 3, 7, 8, 10, 11, 12, 13, 19, 22, 26. Oklahoma, 14, 21. Oregon, 1, 2, 14, 18, 20. Pennsylvania, 2, 13, 16, 20, 21. Rhode Island, 20, 22. South Carolina, 4, 6, 7, 8, 28, 29. South Dakota, 1, 9. Tennessee, 6, 7, 16, 22, 24, 25, 26, 31. Texas, 21, 27. Utah, 10. Vermont, 13, 14, 22. Virginia, 2, 3, 10, 11, 13, 16, 26, 28, 29. Washington, 1, 2, 9, 12, 16. West Virginia, 1, 2, 3, 10, 11, 12, 16, 20, 25. Wisconsin, 20, 21, 22.

HUMIDITY.

The relative humidity was normal in the Ohio Valley and Tennessee and the upper Lake region; above normal in New England, the Florida Peninsula, lower Lake region, upper Mississippi and Missouri valleys, and the northern slope and north Pacific regions; and below normal in the remaining districts, markedly so in the Gulf States, southern slope and southern Plateau regions, and the middle and south Pacific districts.

The averages by districts appear in the subjoined table:

Average relative humidity and departures from the normal.

Districts.	Average.	Departure from the normal.	Districts.	Average.	Departure from the normal.
New England.....	79	+3	Missouri Valley.....	77	+2
Middle Atlantic.....	74	+2	Northern Slope.....	76	+2
South Atlantic.....	74	+3	Middle Slope.....	65	+6
Florida Peninsula.....	83	+12	Southern Slope.....	57	-9
East Gulf.....	70	-7	Southern Plateau.....	42	-8
West Gulf.....	67	-9	Middle Plateau.....	68	+2
Ohio Valley and Tennessee.....	77	0	Northern Plateau.....	78	+2
Lower Lake.....	83	+2	North Pacific.....	87	+2
Upper Lake.....	83	0	Middle Pacific.....	74	-7
North Dakota.....	76	-4	South Pacific.....	59	-13
Upper Mississippi Valley.....	80	+2			

SUNSHINE AND CLOUDINESS.

The distribution of sunshine is graphically shown on Chart IV, and the numerical values of average daylight cloudiness, both for individual stations and by geographic districts, appear in Table I.

The averages for the various districts, with departures from the normal, are shown in the following table:

Average cloudiness and departures from the normal.

Districts.	Average.	Departure from the normal.	Districts.	Average.	Departure from the normal.
New England.....	6.0	+0.2	Missouri Valley.....	5.4	+0.3
Middle Atlantic.....	5.8	+0.2	Northern Slope.....	5.8	+1.2
South Atlantic.....	5.2	-0.1	Middle Slope.....	4.0	+0.2
Florida Peninsula.....	5.2	+0.5	Southern Slope.....	3.2	-0.6
East Gulf.....	5.3	-0.3	Southern Plateau.....	1.8	-1.1
West Gulf.....	4.1	-1.3	Middle Plateau.....	3.9	-0.9
Ohio Valley and Tennessee.....	6.2	-0.2	Northern Plateau.....	6.9	-0.4
Lower Lake.....	7.5	0.0	North Pacific.....	8.5	+1.4
Upper Lake.....	6.7	-0.1	Middle Pacific.....	3.7	-1.1
North Dakota.....	5.3	+0.6	South Pacific.....	2.4	-1.7
Upper Mississippi Valley.....	5.3	0.0			

The cloudiness was normal in the lower Lake region, and upper Mississippi Valley; above the average in New England, Middle Atlantic States, Florida Peninsula, North Dakota, Missouri Valley, and the northern and middle slope and north Pacific regions. In the remaining geographic districts the cloudiness was below the average.

ATMOSPHERIC ELECTRICITY.

Numerical statistics relative to auroras and thunderstorms are given in Table IV, which shows the number of stations from which meteorological reports were received, and the number of such stations reporting thunderstorms (T) and auroras (A) in each State and on each day of the month, respectively.

Thunderstorms.—Reports of 427 thunderstorms were received during the current month as against 372 in 1903 and 164 during the preceding month.

The dates on which the number of reports of thunderstorms for the whole country was most numerous were: 22d, 90; 21st, 79; 20th, 48.

Reports were most numerous from: Florida and Texas, 39; Missouri, 35; South Carolina and Tennessee, 28.

Auroras.—The evenings on which bright moonlight must have interfered with observations of faint auroras are assumed to be the four preceding and following the date of full moon, viz: December 30 to January 7.

In Canada: Thunderstorms were reported from Toronto, 22, and Hamilton, Bermuda, 14.

Auroras were reported from Father Point, 15; Minnedosa, 11, 16, 28; Edmonton, 10, 11, 12; Prince Albert, 10, 11, 25; Battleford, 11, 12, 23.

WIND.

The maximum wind velocity at each Weather Bureau station for a period of five minutes is given in Table I, which also gives the altitude of Weather Bureau anemometers above ground.

Following are the velocities of 50 miles and over per hour registered during the month:

Maximum wind velocities.

Stations.	Date.	Velocity.	Direction.	Stations.	Date.	Velocity.	Direction.
Birmingham, Ala.....	23	50	se.	New York, N. Y.....	17	54	nw.
Block Island, R. I.....	12	52	n.	North Head, Wash.....	3	58	se.
Do.....	3	56	n.	Do.....	4	54	nw.
Do.....	4	66	nw.	Do.....	8	59	s.
Do.....	15	54	w.	Do.....	9	78	se.
Do.....	17	53	nw.	Do.....	11	60	se.
Do.....	25	56	w.	Do.....	13	54	s.
Do.....	26	54	s.	Do.....	15	74	se.
Buffalo, N. Y.....	22	53	w.	Do.....	16	58	s.
Do.....	24	58	w.	Do.....	17	58	s.
Do.....	26	54	w.	Do.....	20	54	se.
Cape Henry, Va.....	3	68	nw.	Point Reyes Light, Cal..	4	62	nw.
Carson City, Nev.....	10	52	w.	Do.....	5	58	nw.
Cheyenne, Wyo.....	18	50	w.	Do.....	8	59	nw.
Chicago, Ill.....	2	54	ne.	Do.....	9	57	nw.
Do.....	18	51	se.	Do.....	17	56	nw.
Cleveland, Ohio.....	2	56	ne.	Do.....	18	57	nw.
Columbus, Ohio.....	22	61	sw.	Do.....	19	50	nw.
Hatteras, N. C.....	3	52	n.	Do.....	21	53	nw.
Do.....	29	50	n.	Sioux City, Iowa.....	18	60	se.
Minneapolis, Minn.....	18	50	se.	Tatoosh Island, Wash...	7	60	s.
Modena, Utah.....	18	55	sw.	Do.....	8	70	w.
Mount Tamalpais, Cal....	8	70	nw.	Do.....	12	71	s.
Do.....	9	59	nw.	Do.....	13	56	sw.
Nantucket, Mass.....	3	60	n.	Do.....	16	70	sw.
New York, N. Y.....	15	53	nw.	Do.....	23	50	nw.

DESCRIPTION OF TABLES AND CHARTS.

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For description of tables and charts see page 603 of REVIEW for December, 1903.